

Title:

Snow Guillotine: Visualization and Statistics of Meltwater Flowpaths in a Wet Snowpack

Abstract:

The transport of meltwater through a wet and draining snowpack is a poorly understood aspect of snow hydrology, even though the meltwater process is an important component of snowpack stability, water resource forecasting, and contaminant transport modeling. Numerous field experiments have shown that a draining snowpack does not behave as a homogeneous porous medium, but rather routes significant quantities of meltwater through vertical preferential pathways and horizontally along stratigraphic interfaces. Meltwater within the snowpack may affect stability by rapidly altering grains and bonds. In subfreezing snowpacks meltwater may refreeze to form ice columns and lenses. Dye tracer experiments are often used to identify preferential flowpaths within a snowpack. In these experiments, a colored dye is applied to a melting snow surface, and the dye is carried along into the snowpack with the meltwater. In order to take quantitative measurements of the occurrence of meltwater pathways, an instrument (the snow guillotine) was designed to shave thin layers off the side of the snowpit wall, exposing preferential pathways. A sequence of vertical sections is then imaged with a digital camera to create a 3-D data set of preferential pathways. The occurrence of preferential pathways can be analyzed using connectivity statistics, which allow the preferential pathway networks of different snowpacks to be compared. Various snowpacks in the Colorado Rocky Mountains were analyzed to identify the effects of differing elevation, slope, and aspect on the occurrence of meltwater pathways.

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SNOW GRAIN SIZE GAUGE "BEADSNOW 2000"

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ABSTRACT

Normally a hand lens and a crystal screen with a millimeter grid are used to determine the size of snow grains in the field. In this method each of snow grains is observed. In this paper, a new type of snow grain size gauge, the BEADSNOW 2000, is described. This gauge employs transparent glass beads of a range of sizes as visual samples for comparison purposes instead of a crystal screen with millimeter grid. The determination of the size of snow crystals is easily made by observing macroscopic groups of snow grains; no hand lens is needed. The sizes of the glass beads in the gauge are 0.2mm, 0.5mm, 1.0mm and 2.0mm, corresponding to the international classification of grain size.